Occupational Safety

Some significant events in occupational safety in the United States include:

In 1812, the Embargo of the War of 1812 spurred the development of the New England textile industry and the founding of factory mutual companies. These early insurance companies inspected properties for hazards and suggested loss control and prevention methods in order to secure low rates for their policyholders.

In 1864, The Pennsylvania Mine Safety Act (PMSA) was passed into law.

In 1864, North America's first accident insurance policy was issued.

In 1867, the state of Massachusetts instituted the first government-sponsored factory inspection program.

In 1877, the state of Massachusetts passed a law requiring guarding for dangerous machinery, and took authority for enforcement of factory inspection programs.

In 1878, the first recorded call by a labor organization for federal occupational safety and health law is heard.

In 1896, an association to prevent fires and write codes and standards, the National Fire Protection Association (NFPA), was founded.

In 1902, the state of Maryland passed the first workers' compensation law.

In 1904, the first attempt by a state government to force employers to compensate their employees for on-the-job injuries was overturned when the Supreme Court declared Maryland's workers' compensation law to be unconstitutional.

In 1911, a professional, technical organization responsible for developing safety codes for boilers and elevators, the American Society of Mechanical Engineers (ASME) was founded.

1911-1915, During this five-year period, 30 states passed workers' compensation laws.

In 1911, the American Society of Safety Engineers (ASSE) was founded. The ASSE was dedicated to the development of accident prevention techniques, and to the advancement of safety engineering as a profession.

In 1912, a group of engineers representing insurance companies, industry, and government met in Milwaukee to exchange data on accident prevention. The organization formed at this meeting was to become the National Safety Council (NSC). (Today, the NSC carries on major safety campaigns for the general public, as well as assists industry in the development of safety promotion programs.)

In 1916, the Supreme Court upheld the constitutionality of state workers' compensation laws.

In 1918, the American Standards Association was founded. Responsible for the development of many voluntary safety standards, some of which are referenced into laws, today, it is now called the American National Standards Institute (ANSI).

In 1936, Frances Perkins, Secretary of Labor, called for a federal occupational safety and health law. This action came a full 58 years after organized labor's first recorded request for a law of this nature.

In 1936, the Walsh-Healey (Public Contracts) Act passed. This law required that all federal contracts be fulfilled in a healthful and safe working environment.

By 1948, all states (48 at the time) now had workers' compensation laws.

In 1952, Coal Mine Safety Act (CMSA) was passed into law.

In 1960, specific safety standards were promulgated for the Walsh-Healey Act.

In 1966, the Metal and Nonmetallic Mines Safety Act (MNMSA) was passed.

In 1966, the U.S. Department of Transportation (DOT) and its sections, the National Highway Traffic Safety Administration (NHTSA) and the National Transportation Safety Board (NTSB), were established.

In 1968, President Lyndon Johnson called for a federal occupational safety and health law.

In 1969, the Construction Safety Act (CSA) was passed.

In 1969, the Board of Certified Safety Professionals (BCSP) was established. This organization certifies practitioners in the safety profession.

In 1970, President Richard Nixon signed into law the Occupational Safety and Health Act (OSH Act), thus creating the OSHA administration and the National Institute for Occupational Safety and Health (NIOSH).

Functions of the Professional Safety Position

The major areas relating to the protection of people, property and the environment are:

- Anticipate, identify and evaluate hazardous conditions and practices.
- Develop hazard control designs, methods, procedures and programs.
- Implement, administer and advise others on hazard controls and hazard control programs.
- Measure, audit and evaluate the effectiveness of hazard controls and hazard control programs.

Anticipate, Identify and Evaluate Hazardous Conditions and Practices

This function involves:

1. Developing methods for
   a. anticipating and predicting hazards from experience, historical data and other information sources.
   b. identifying and recognizing hazards in existing or future systems, equipment, products, software, facilities, processes, operations and procedures during their expected life.
   c. evaluating and assessing the probability and severity of loss events and accidents which may result from actual or potential hazards.
2. Applying these methods and conducting hazard analyses and interpreting results.
3. Reviewing, with the assistance of specialists where needed, entire systems, processes, and operations for failure modes, causes and effects of the entire system, process or operation and any sub-systems or components due to
   a. system, sub-system, or component failures.
   b. human error.
   c. incomplete or faulty decision making, judgements or administrative actions.
   d. weaknesses in proposed or existing policies, directives, objectives or practices.

Anticipate, Identify and Evaluate Hazardous Conditions and Practices (cont'd)

4. Reviewing, compiling, analyzing and interpreting data from accident and loss event reports and other sources regarding injuries, illnesses, property damage, environmental effects or public impacts to
   a. identify causes, trends and relationships.
   b. ensure completeness, accuracy and validity of required information.
   c. evaluate the effectiveness of classification schemes and data collection methods.
   d. initiate investigations.
5. Providing advice and counsel about compliance with safety, health and environmental laws, codes, regulations and standards.
6. Conducting research studies of existing or potential safety and health problems and issues.
7. Determining the need for surveys and appraisals that help identify conditions or practices affecting safety and health, including those which require the services of specialists, such as physicians, industrial hygienists, fire protection engineers, design and process engineers, etc.
8. Assessing environments, tasks and other elements to ensure that physiological and psychological capabilities, capacities and limits of humans are not exceeded.

Develop Hazard Control Designs, Methods, Procedures, and Programs

This function involves:

1. Formulating and prescribing engineering or administrative controls, preferably before exposures, accidents, and loss events occur, to
   a. eliminate hazards and causes of exposures, accidents and loss events.
   b. reduce the probability or severity of injuries, illnesses, losses or environmental damage from potential exposures, accidents, and loss events when hazards cannot be eliminated.
2. Developing methods which integrate safety performance into the goals, operations and productivity of organizations and their management and into systems, processes, and operations or their components.
3. Developing safety, health and environmental policies, procedures, codes and standards for integration into operational policies of organizations, unit operations, purchasing and contracting.

Develop Hazard Control Designs, Methods, Procedures, and Programs (cont'd)

4. Consulting with and advising individuals and participating on teams
   a. engaged in planning, design, development and installation or implementation of systems or programs involving hazard controls.
   b. engaged in planning, design, development, fabrication, testing, packaging and distribution of products or services regarding safety requirements and application of safety principles which will maximize product safety.
5. Advising and assisting human resources specialists when applying hazard analysis results or dealing with the capabilities and limitations of personnel.
6. Staying current with technological developments, laws, regulations, standards, codes, products, methods and practices related to hazard controls.

Implement, Administer and Advise Others on Hazard Controls and Hazard Control Programs

This function involves:

1. Preparing reports which communicate valid and comprehensive recommendations for hazard controls which are based on analysis and interpretation of accident, exposure, loss event and other data.
2. Using written and graphic materials, presentations and other communication media to recommend hazard controls and hazard control policies, procedures and programs to decision making personnel.
3. Directing or assisting in planning and developing educational and training materials or courses. Conducting or assisting with courses related to designs, policies, procedures and programs involving hazard recognition and control.
4. Advising others about hazards, hazard controls, relative risk and related safety matters when they are communicating with the media, community and public.
5. Managing and implementing hazard controls and hazard control programs which are within the duties of the individual's professional safety position.

Measure, Audit and Evaluate the Effectiveness of Hazard Controls and Hazard Control Programs

This function involves:

1. Establishing and implementing techniques, which involve risk analysis, cost, cost-benefit analysis, work sampling, loss rate and similar methodologies, for periodic and systematic evaluation of hazard control and hazard control program effectiveness.
2. Developing methods to evaluate the costs and effectiveness of hazard controls and programs and measure the contribution of components of systems, organizations, processes and operations toward the overall effectiveness.
3. Providing results of evaluation assessments, including recommended adjustments and changes to hazard controls or hazard control programs, to individuals or organizations responsible for their management and implementation.
4. Directing, developing, or helping to develop management accountability and audit pro which assess safety performance of entire systems, organizations, processes and operations or their components and involve both deterrents and incentives.

Industrial Hygiene (IH)

. . . "that science and art devoted to the anticipation, recognition, evaluation, and control of those environmental factors or stresses arising in or from the workplace, which may cause sickness, impaired health and well-being, or significant discomfort among workers or among the citizens of the community"

Industrial Hygiene History

- As early as fourth century BC, Hippocrates noted lead toxicity in mining industry
- In first century AD, Pliny the Elder devised a face mask from an animal bladder to protect workers from exposure to dust and lead fumes
- In 1700, Bernardo Ramazzini (the "father of industrial medicine") published first comprehensive book that accurately described occupational diseases of most workers of his time
- In 1913, New York Dep't. of Labor and Ohio Dep't. of Health established first state IH programs
- In 1970, U.S. Congress passed Occupational Safety and Health Act

OSHA and Industrial Hygiene

- More than 40 percent of OSHA compliance officers are IH's
- Evaluate jobs for potential health hazards and help eliminate or control them through appropriate measures
- OSHA regulates more than 450 chemicals

Worksite Analysis

- Essential first step that helps an IH determine what jobs and work stations are the sources of potential problems
- IH measures and identifies exposures, problem tasks, and risks

Hierarchy of Controls

- Engineering controls
  - substitution
  - process modification
  - enclosing or confining operations or worker
  - ventilation
- Administrative controls
  - work practice controls
  - job rotation
  - task timing
- Personal protective equipment
  - last line of defense!
  - gloves, goggles, helmets, safety shoes, protective clothing, respirators
  - individually selected, properly fitted and periodically refitted, properly worn, regularly maintained, and replaced as necessary

Examples of Job Hazards

- Chemical
- Biological
- Physical
- Ergonomic

Chemical Hazards

- Solids
- Liquids
- Gases
- Vapors
- Dusts
- Fumes
- Mists

Biological Hazards

- Bacteria, viruses, fungi and other living organisms
- Food and food processing
- Laboratory and medical personnel
- Contact with bodily fluids

Physical Hazards

- Ionizing and nonionizing electromagnetic radiation
- Noise
- Vibration
- Illumination
- Temperature

Ergonomics

- Deals with the variety of ways in which people interact with their work environment, including design and function of controls, displays, safety devices, lighting, temperature, work place layout, tools, and work organization
- Basic goal: adapt the job to fit the person
- Lifting, holding, pushing, walking, reaching, repetitive motions (carpal tunnel syndrome)